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Observations of the Transit of Mercury, 1891, *May* 9.

By Professor Kavasgee D. Naegamvala.

The Transit of *Mercury* of May 9 last was observed here on the morning of May 10, civil time. The telescope employed was a Newtonian Reflector (with the silvering removed from the glass parabolic mirror) of 16½″ aperture. No solar eyepiece was used, but a Pritchard's wedge was interposed between the ordinary Huyghenian eyepiece and the eye. The power employed almost throughout was about 130 diameters, as it was found inadvisable to use even the next higher power available, owing to the atmospheric conditions being not of the very best. The limb of the Sun was never observed perfectly quiescent, but throughout it appeared more or less tremulous.

The first part of the transit was not observed, as the Sun rose some time after ingress.

The form of the planetary disc during transit appeared to be circular and of a very inky colour, and comparatively much darker than the brownish-black umbra of the large sun-spot then visible on the luminary.

No inner bright spot was seen on the planet's disk, as noted by most of the previous observers,* but the aureola of light surrounding the disc was, on the other hand, well seen. The aureola was circular, and the thickness of the ring of light was estimated by the eye to be about two-thirds the diameter of the disc itself. It was, moreover, decidedly brighter than the general surface of the Sun, though the intensity of the illumination slightly fell off at the margin of the ring. I may remark that the aureola was best seen when the darkest part of the Pritchard wedge was interposed, and was gradually lost sight of as the wedge was shifted and its lighter portions brought opposite to the eye, even when the depth of colour of the wedge was sufficient to enable the general surface of the Sun to be observed, not only with complete safety, but also with comfort. More than once I had a feeling that the aureola was slightly coronal in character, but I don't lay any stress on it. The aureola was seen up to a very short time of the internal contact at egress, but I did not exactly note the time of its disappearance, as my attention was then directed more to the first formation of the bright ligament and black drop, if any.

The bright ligament was sharply formed, and when just broken the planet's disc at once assumed a pear-like shape. Within two or three seconds, however, a very curious phenomenon was observed. A smaller pear (so to call it), about one-

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* The previously recorded observations of the 'bright spot,' as far as I am aware, were all taken with *refractors*, with the exception of a single one, *vide Monthly Notices*, R.A.S., vol. xxix., p. 57, and a doubt, more than once expressed by astronomers, that the phenomenon was an optical one.

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third the size of the other and of a lighter tint (i.e. *less black*), was seen to hang outside the limb of the Sun, the "pears" being attached together by their necks in one line. This lasted for about half a minute. The disc of the egressing planet next took the form of a half ellipse, with the semi-minor axis more or less radial; while just before external contact the disc assumed the form of a short and very flat dummy truncated cone with the apex towards the centre of the Sun. The height of the cone gradually grew less and less, till the planet was completely lost to view. The actual external contact was not well observed, owing to the tremulous state of the Sun's limb. For this reason also no time-observations with the chronograph were taken.

The planet could not be observed after egress, though a very careful search was made for it. No appearance resembling that of a satellite was noted during the transit, but it must be remarked here that I was throughout unfortunately prevented from using high powers through unfavourable atmospheric conditions.

The Observatory, College of Science,
Poona, India: 1891 *May* 15.

Note.

Father de Penaranda, Director of the Observatory of the St. Xavier's College, Calcutta, has issued his report, a newspaper reprint of which I beg to enclose. The colour of the planet therein is designated as being of "an intense *purple*-black," while my impression was that it was *inky*-black. The wedges employed by me were alternately two: one that I had received directly from Professor Pritchard, during my visit to European observatories in 1884, and the other was the one I had at the same time purchased from Mr. Hilger. Both of them are of excellent neutral tint; while I am not aware what means were employed by Father de Penaranda to modify the light of the Sun.

Poona: 1891 *May* 21.

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The Transit of Mercury. By the Rev. A. de Penaranda, S.J.

(*Communicated by Prof. K. D. Naegamvala.*)

The Transit of *Mercury* was fairly well observed at St. Xavier's College Observatory, Calcutta, and some good photographs were obtained. The weather, although not all that could have been desired, was more favourable than one would have expected at this season of the year. After a stormy evening and a boisterous night, the Sun rose glorious in a clear sky, and found the three astronomers at their posts making the last adjustments. Both the small and the large equatoreal were put in requisition; the latter, by a special arrangement, giving both a direct and a projected image. The ingress, although visible, could scarcely be said to be properly observable. The Sun then being little more than 5° above the horizon, the boiling at this low altitude was such that it resembled the waves of an agitated sea, among which the tiny black dot's presence could be guessed rather than seen. As far as could be observed or estimated, it was slightly *behind time*, the first external contact taking place at about $5^h\ 51^m$, instead of $5^h\ 50^m\ 3^s$. At egress, the internal contact, despite the very annoying interference of clouds, could be more satisfactorily timed. In fact, there was here a wonderful and rare consensus to the last second of all the observers; from which it appears that the planet now was slightly *before its time*, reaching the Sun's western limb at $10^h\ 17^m\ 17^s$, instead of the computed $10^h\ 18^m\ 49^s$—a difference of $1^m\ 32^s$. Combining this priming with the lagging at ingress, the whole transit seems to have lasted from 2 to $2\frac{1}{2}$ minutes less than computed. This small error of 2 minutes on nearly 5 hours may be accounted for either by some slight imperfection in the astronomical tables of *Mercury*, or by some small excess in the adopted magnitude of the Sun's apparent diameters; or is perhaps owing to a combination of both causes. The planet's aureola was distinctly seen of a decided yellow tinge; the planet itself appearing of an intense purple-black; whereas the spots—even their nuclei—seemed rather of a brownish and notably less deep black. This does not appear to be a mere optical illusion due to contrast, as the photographs bear traces of it. *Mercury*, though to the sight much darker than any nucleus and larger than most of them, but purple, is only slightly marked on the photographs; while small spots, though lighter in colour, but brownish, are much more strongly indicated. The time of the internal contact at ingress could only be approximately estimated on account of the agitation of the Sun's limb; the external contact at egress could not be observed, the Sun being covered by clouds.